

Atoms for Peace and Development

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In reply please refer to: EVT1805009 Dial directly to extension: (+43 1) 2600-22671

The Secretariat of the International Atomic Energy Agency (IAEA) presents its compliments to the IAEA's Member States and has the honour to draw their attention to the Technical Meeting on the Management of Direct Current Power Systems and Application of New Devices in Safety Electrical Power Systems for Nuclear Power Plants (hereinafter referred to as "event") to be held at the IAEA's Headquarters in Vienna, Austria, from 2 to 6 December 2019.

The purpose of the event is to discuss current challenges related to the operation, maintenance and use of new digital devices in the direct current safety power systems of nuclear power plants, including the necessary plant modifications.

The attached Information Sheet provides further details of the event.

The event will be held in English.

Member States are invited to designate one or more participants for this event. Member States are strongly encouraged to identify suitable women participants.

The IAEA is generally not in a position to bear the travel and other costs of participants in the event. The IAEA has, however, limited funds at its disposal to help meet the cost of attendance of certain participants. Upon specific request, such assistance may be offered to normally one participant per country, provided that, in the IAEA's view, the participant will make an important contribution to the event. The application for financial support should be made at the time of designating the participant using the attached Grant Application Form (Form C).

It should be noted that compensation is not payable by the IAEA for any damage to or loss of personal property. The IAEA also does not provide health insurance coverage for participants in IAEA events. Arrangements for private insurance coverage on an individual basis should therefore be made. The IAEA will, however, provide insurance coverage for accidents and illnesses that clearly result from any work performed for the IAEA.

Designations should be submitted to the IAEA through the competent national authority (Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) not later than 29 May 2019 using the attached Participation Form (Form A). Completed and authorized Participation Forms should be sent either by email to: Official.Mail@iaea.org or by fax to: +43 1 26007 (no hard copies needed). Copies should be sent by email to the Scientific Secretary of the event, Mr Alexander Duchac, Division of Nuclear Installation Safety, Department of Nuclear Safety and Security (Email: A.Duchac@iaea.org), and to the Administrative Secretary, Ms Leticia Sedlazek (Email: L.Sedlazek@iaea.org). The Scientific Secretary of the event will liaise with the participants directly concerning further arrangements, including travel details, as appropriate, once the official designations have been received.

The Secretariat of the International Atomic Energy Agency avails itself of this opportunity to assure the IAEA's Member States of its highest consideration.



2019-02-07

Enclosures: Information Sheet

Participation Form (Form A)

Form for Submission of a Paper (Form B)

Grant Application Form (Form C)



Technical Meeting on the Management of Direct Current Power Systems and Application of New Devices in Safety Electrical Power Systems for Nuclear Power Plants

IAEA Headquarters Vienna, Austria

2-6 December 2019

Ref. No: EVT1805009

Information Sheet

A. Introduction

Recent operating experience at nuclear power plants (NPPs) has identified two significant safety concerns; one associated with the direct current (DC) safety power systems due to accelerated ageing of batteries and the other from the use of new devices and technology including power electronic and smart devices (e.g. digital protection relays) in electrical power equipment for replacement, modernization, obsolescence or new build on both AC and DC systems.

A.1 Direct Current Power Systems

A DC system supplies DC loads without interruption through the use of batteries. DC power systems include batteries, rectifiers/chargers and inverters. Separate DC power systems are sometimes provided to support loads of different safety classes. An uninterruptible AC power system supplies power from inverters or motor generator sets that are in turn supplied from a DC power source, such as the DC power

system or dedicated batteries with rectifiers. Such systems often include a bypass circuit to allow feeding safety loads directly from safety class AC power systems in maintenance and emergency situations.

The expected service life of a station battery is normally based on the manufacturer's information and the anticipated operating conditions of the plant. The frequency of battery tests is normally derived from the expected battery service life and an understanding of the anticipated degradation rate. An accelerated degradation could render the periodic testing ineffective to detect early degradation of a battery. Accelerated degradation of the batteries, if not managed properly, may lead to a scenario in which the DC safety power systems are unable to perform their intended safety functions. The accelerated ageing of the battery may affect redundant trains and has the potential to result in a common cause failure.

A.2 Application of New Devices in Electrical Power Systems

The active components of AC/DC power systems, such as rectifiers, inverters, bypass systems, circuit breakers and electrical protective devices, often now contain industrial digital devices designed against other non-nuclear standards. In some cases, the presence of such digital devices may remain unknown to the plant operator. This is a safety concern because safety classified equipment, part of which is a digital device, requires more rigorous qualification. The suitability of integrated industrial digital devices in the safety application should have demonstrated evidence that the principal safety functions of the device could meet the functional requirements for the application, and that the device is free from faults that could credibly result in common cause failures where defence in depth should be preserved.

The design of the complete safety power system needs to be evaluated, tested and inspected systematically to advance the system durability.

A.3 International Cooperation

Over the past ten years, the IAEA has implemented a number of activities that addressed specific electrical related issues at NPPs. The IAEA revised a number of safety standards, including IAEA Safety Standards Series No. SSR-2/1 (Rev. 1), Safety of Nuclear Power Plants: Design, and SSG-34, Design of Electrical Power Systems for Nuclear Power Plants, and developed several technical reports, including TECDOC-1770, Design Provisions for Withstanding Station Blackout at Nuclear Power Plants, and Safety Reports Series No. 91, Impact of Open Phase Conditions on Electrical Power Systems of Nuclear Power Plants.

The Committee on the Safety of Nuclear Installations of the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development established a permanent Working Group on Electrical Power Systems in January 2016, as a follow up to the DIDELSYS¹ and ROBELSYS² activities. The Working Group's objectives aim to improve international understanding on the issues which can lead to a degraded power supply challenging the functionality of equipment relying on electrical power systems, and sharing good practice techniques to prevent, detect and mitigate such events. A review of the information presented by the working group concluded that the management of DC power systems and application of new power electronic and digital devices in safety electrical power systems were of concern to all participants. It was therefore recommended that the group should consider a more focused activity on this topic to collect and share good practice and determine if additional guidance would benefit the industry.

¹ Defence in Depth of Electrical Systems and Grid Interaction (DIDELSYS) Task Group established in January 2008 based on the findings of an NEA sponsored workshop on lessons learned from the July 2006 Forsmark-1 event held in Stockholm, Sweden in 5–7 September 2007.

² Robustness of Electrical Systems (ROBELSYS) was a continuation of the DIDELSYS Task Group.

B. Objectives

The objective of the event is to discuss current challenges related to the operation, maintenance and use of new digital devices in the direct current safety power systems of nuclear power plants, including the necessary plant modifications.

C. Target Audience

Participation is solicited from staff members of regulatory bodies, NPP operators, utility organizations, design and engineering consultant organizations, as well as from international organizations engaged in activities related to NPP safety and regulation. To ensure maximum effectiveness in the exchange of information, participants should be persons actively involved in the subject of the meeting.

The meeting is, in principle, open to all officially designated persons. The IAEA, however, reserves the right to restrict participation due to limitations imposed by the available facilities. It is, therefore, recommended that interested persons take the necessary steps for the official designation as early as possible.

D. Working Language(s)

The working language of the meeting will be English. No simultaneous interpretation will be provided.

E. Expected outputs

An important aim of the meeting is to ensure that the practices of Member States or standards developed by other international organizations are identified and assessed for appropriate application.

It is expected that the meeting will also provide valuable recommendations for future IAEA/NEA activities in the areas covered by the meeting, and for strengthening international cooperation to advance nuclear safety.

F. Structure

The meeting presentations will be organized to address two main topics: DC Power Systems, and Application of New Devices in Electrical Power Systems.

The opening session will include welcome addresses. This session will be further complemented by keynote presentations on the importance of the Technical Meeting's overall theme. The topic of each session will be introduced by a chairperson, followed by oral presentations that will be selected based on papers submitted to the IAEA Scientific Secretary. Each session will comprise a common discussion.

Finally, during the concluding session, the respective chairpersons will summarize their sessions. After the Technical Meeting, the IAEA will consolidate and publish the meeting's findings, conclusions and recommendations.

G. Topics

The main theme of the Technical Meeting will be devoted to the safety demonstration of NPPs addressing the following key topical issues. The proposed papers should set out examples and case studies relevant to these issues:

1. Safety DC Power Systems

- Identifying experience on significant events related to batteries and associated equipment, including chargers, inverters and diagnostic tools;
- Gathering major current provisions for capacity and in-service testing in plant technical specifications, and other maintenance activities;
- Identifying possible new approaches to establishing improved programs for maintenance and monitoring of safety batteries and associated equipment; and
- Establishing common themes, lessons learned, if any, and measures for the early detection of degradation or failure of batteries.

2. New Power Electronic and New Devices in Safety Power Systems

- Identification of common safety issues and lessons learned from the plant electrical events and replacement programmes;
- Impact of new equipment on existing system design;
- Regulatory expectations on the use of modern equipment;
- Safety benefits and plant efficiencies realized from the use of modern equipment;
- Approaches taken to qualify and utilize such systems and new equipment; and
- Identification of possible benefits to the international community of additional guidance for each type of event.

Whilst some may consider these two separate topics, they are very much linked since battery chargers and uninterruptible power supply systems are the types of equipment that have often been cited as difficult to replace. It is anticipated that the same technical experts would be involved in both discussions.

H. Participation and Registration

All persons wishing to participate in the event have to be designated by an IAEA Member State or should be members of organizations that have been invited to attend.

In order to be designated by an IAEA Member State, participants are requested to send the Participation Form (Form A) to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) for onward transmission to the IAEA by 29 May 2019. Participants who are members of an organization invited to attend are requested to send the Participation Form (Form A) through their organization to the IAEA by above deadline.

Selected participants will be informed in due course on the procedures to be followed with regard to administrative and financial matters.

Please note that the IAEA is in a transition phase to manage the entire registration process for all regular programme events electronically through the new InTouch+ (https://intouchplus.iaea.org) facility, which is the improved and expanded successor to the InTouch platform that has been used in recent years for the IAEA's technical cooperation events. Through InTouch+, prospective participants will be able to apply for events and submit all required documents online. National authorities will be able to use InTouch+ to review and approve these applications. Interested parties that would like to use this new facility should write to: IntouchPlus.Contact-Point@iaea.org.

I. Papers and Presentations

The IAEA encourages participants to give presentations on the work of their respective institutions that falls under the topics listed in Section G above.

Participants who wish to give presentations are requested to submit an abstract of their work. The abstract will be reviewed as part of the selection process for presentations. The abstract should be in A4 page format and should not exceed 200 words. It should be sent electronically to Alexander Duchac, the Scientific Secretary of the event (see contact details in Section N below), not later than **29 May 2019**. Authors will be notified of the acceptance of their proposed paper by **28 June 2019**.

In addition, participants have to submit the abstract together with the Participation Form (Form A) and the attached Form for Submission of a Paper (Form B) to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) or their organization for onward transmission to the IAEA not later than 29 May 2019.

Concise papers on topics falling within the scope of the conference (see Section E) may be submitted as contributions to the meeting. All papers, apart from invited papers, must present original work and must not have been published elsewhere.

Authors of papers are requested to submit a contributed paper of between three and five pages. Contributed papers should be sent electronically to Alexander Duchac, the Scientific Secretary of the event (see contact details in Section N below), as both PDF and Word files not later than 30 September 2019.

Authors of papers selected for oral presentation should prepare a presentation lasting no more than 20 minutes, and to allow a further ten minute discussion. Presentations should be sent electronically in PowerPoint format to Alexander Duchac, the Scientific Secretary of the event (see contact details in Section N below) not later than 22 November 2019.

J. Expenditures and Grants

No registration fee is charged to participants.

The IAEA is generally not in a position to bear the travel and other costs of participants in the event. The IAEA has, however, limited funds at its disposal to help meet the cost of attendance of certain participants. Upon specific request, such assistance may be offered to normally one participant per

country, provided that, in the IAEA's view, the participant will make an important contribution to the event.

The application for financial support should be made using the **Grant Application Form (Form C)** which has to be stamped, signed and submitted by the competent national authority to the IAEA together with the **Participation Form (Form A)** by **29 May 2019**.

K. Venue

The event will be held at the Vienna International Centre (VIC) where the IAEA's Headquarters are located. Participants must make their own travel and accommodation arrangements.

General information on the VIC and other practical details, such as a list of hotels offering a reduced rate for IAEA participants, are listed on the following IAEA web page: http://www-pub.iaea.org/iaeaevents/GeneralInfo/Guide/VIC.

Participants are advised to arrive at Checkpoint 1/Gate 1 of the VIC one hour before the start of the event on the first day in order to allow for timely registration. Participants will need to present an official photo identification document in order to be admitted to the VIC premises.

L. Visas

Participants who require a visa to enter Austria should submit the necessary application to the nearest diplomatic or consular representative of Austria at least four weeks before they travel to Austria. Since Austria is a Schengen State, persons requiring a visa will have to apply for a Schengen visa. In States where Austria has no diplomatic mission, visas can be obtained from the consular authority of a Schengen Partner State representing Austria in the country in question.

M. Additional Information

The meeting will start in the **Room C3** in the **C Building** of the **Vienna International Centre (VIC)** on Monday, 2 December 2019 at 9.30 a.m. and end at 1 p.m. on Friday, 6 December 2019.

The meeting agenda, together with information on local arrangements, will be sent to designated participants not later than one month before the meeting.

N. IAEA Contacts

Scientific Secretary:

Mr Alexander Duchac

Division of Division of Nuclear Installation Safety
Department of Nuclear Safety and Security
International Atomic Energy Agency
Vienna International Centre
PO Box 100
1400 VIENNA
AUSTRIA

Tel.: +43 1 2600 22671 Fax: +43 1 26007 22671 Email: <u>A.Duchac@iaea.org</u>

Administrative Secretary:

Ms Leticia Sedlazek

Division of Division of Nuclear Installation Safety
Department of Nuclear Safety and Security
International Atomic Energy Agency
Vienna International Centre
PO Box 100
1400 VIENNA
AUSTRIA

Tel.: +43 1 2600 22687 Fax: +43 1 26007 22687 Email: <u>L.Sedlazek@iaea.org</u>

Subsequent correspondence on scientific matters should be sent to the Scientific Secretary and correspondence on other matters related to the event to the Administrative Secretary.

O. Event Web Page

Please visit the following IAEA web page regularly for new information regarding this event:

www.iaea.org/events/1805009.



Participation Form

Technical Meeting on the Management of Direct Current Power Systems and Application of New Devices in Safety Electrical Power Systems for Nuclear Power Plants

IAEA Headquarters, Vienna, Austria

To be completed by the participant and sent to the competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA, or National Atomic Energy Authority) of his/her country for subsequent transmission to the International Atomic Energy Agency (IAEA) either by email to: Official.Mail@iaea.org or by fax to: +43 1 26007 (no hard copies needed). Please also send a copy by email to the Scientific Secretary A.Duchac@iaea.org and to the Administrative Secretary L.Sedlazek@iaea.org.

Please attach a passport copy or other document of identification (ID).

Deadline for receipt by IAEA through official channels: 29 May 2019

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Family name: (e.g. Smith)		First name(s): (e.g. J	ohn)	Mr/Ms
Institution:				
Full address:				
Tel. (Fax):				
Email:				
Nationality:	Representing follo invited organization	wing Member State/non:	on-Member State/er	ntity or
If/as applicable:				
Do you intend to submit a p	aper?	Yes	No 🗌	
Would you prefer to present Title:	your paper as a pos	ster? Yes	No 🗌	



Form for Submission of a Paper

Technical Meeting on the Management of Direct Current Power Systems and Application of New Devices in Safety Electrical Power Systems for Nuclear Power Plants

IAEA Headquarters, Vienna, Austria

2-6 December 2019

To be completed by the participant and sent to the competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA, or National Atomic Energy Authority) of his/her country for subsequent transmission to the International Atomic Energy Agency (IAEA) either by email to: Official.Mail@iaea.org or by fax to: +43 1 26007 (no hard copies needed). Please also send a copy by email to the Scientific Secretary A.Duchac@iaea.org and to the Administrative Secretary L.Sedlazek@iaea.org.

Deadline for receipt by IAEA through official channels: 29 May 2019

Title of the paper:		
If applicable: Abstract ID in IAEA	A-INDICO:	
Family name(s) and first name(s) of all author(s): e.g. Smith, John	Scientific establishment(s) in which the work has been carried out	City/Country
1.		
2.		
3.		
Family name and first name(s) of the paper: e.g. Smith, John	author presenting Mr/Ms:	
Mailing address:	'	
Tel. (Fax):		
Email:		

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that the material submitted to the IAEA does not contain any libellous or other unlawful statements and does not contain any materials that violate any personal or proprietary rights of any person or entity.
Date: Signature of main author:



Grant Application Form

Technical Meeting on the Management of Direct Current Power Systems and Application of New Devices in Safety Electrical Power Systems for Nuclear Power Plants

IAEA Headquarters, Vienna, Austria

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Family name: (e.g. Smith)	First name(s	s): (e.g. John)	Mr/M	s:
Mailing address:		Tel.:		
		Fax:		
		Email:		
Date of birth (yy/mm/dd):		Nationality:		
. Education (post-secondary):				
Name and place of institution	Field of study	Diploma or Degree	Years attended from to	
. Recent employment record (st	-	<u> </u>	1.7	
Name and place of employer/ organization	Title of your position	Type of work	from	orked to
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